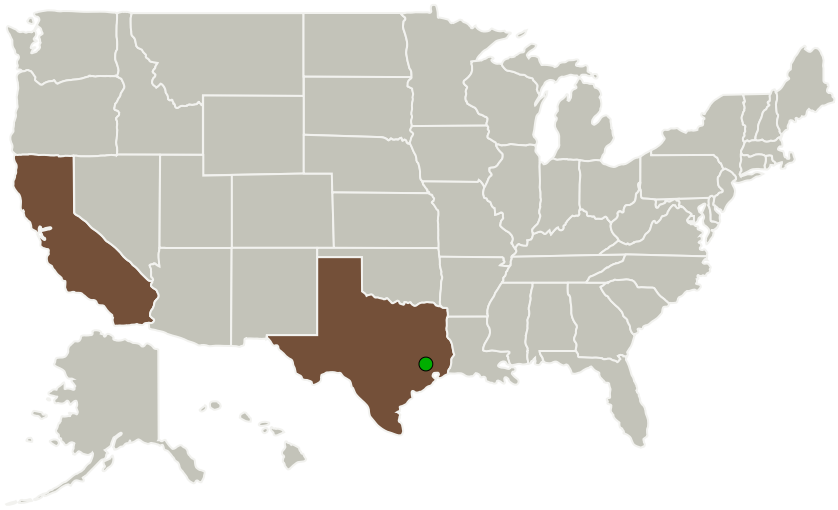
Toward Reducing Crew Time and Conserving Resources: Superhydrophillic Treatment of Hardware in Crew Hygiene Areas, Phase I

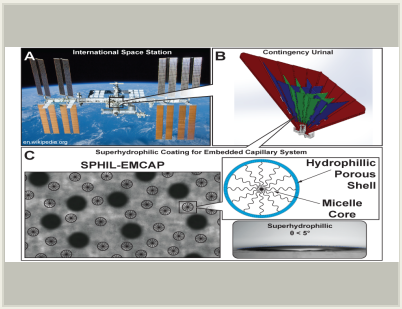
Completed Technology Project (2014 - 2014)

Project Introduction

Significant challenges remain for the designers of life support equipment for spacecraft—primarily for the processing of aqueous fluids: oxygen supply, air revitalization, thermal management systems, water reclamation, medical fluids, and others. The main problem is that failure-prone processes are often employed to overcome unfamiliar microgravity fluidic phenomena using artificial buoyancy-inducing methods. The most obvious example is a mechanical centrifuge for liquid-gas separations aboard orbiting spacecraft. To improve NASA's spacecraft fluid systems design, InnoSense LLC (ISL) proposes to develop Superhydrophilic Coatings for Embedded Capillary Systems (SPHIL-EMCAP) with anti-microbial properties. In Phase I, ISL will design and fabricate a complex capillary solution for spacecraft fluid management. The geometric design will exploit the current state of the art in analytical and computational capillary fluidics. Devices will be coated with SPHIL-EMCAP and evaluated for substrate adhesion, water contact angles, wear, and environment robustness, before testing in the relevant low-g environment to assess the improved capillary control afforded by the superhydrophilic coatings. In Phase II, ISL will downselect materials and applications, and optimize SPHIL-EMCAP's performance by refining the prototyping process and optimizing the superhydrophilic coating formulation. We will perform extensive characterization toward manufacturing a miniaturized SPHIL-EMCAP.

Primary U.S. Work Locations and Key Partners





Toward Reducing Crew Time and Conserving Resources: Superhydrophillic Treatment of Hardware in Crew Hygiene Areas Project Image

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Organizations Performing Work	Role	Type	Location
Innosense, LLC	Lead Organization	Industry Minority-Owned Business, Small Disadvantaged Business (SDB), Women-Owned Small Business (WOSB)	Torrance, California
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
California	Texas

Project Transitions

June 2014: Project Start

December 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139528)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Innosense, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

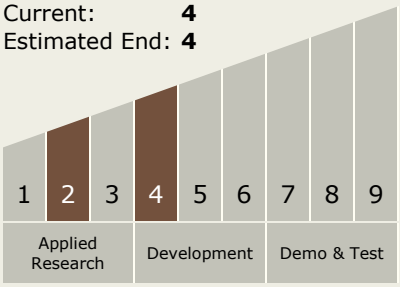
Carlos Torrez

Principal Investigator:

Kevin Yu

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



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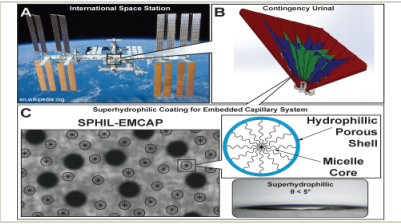
Images



Project Image
Toward Reducing Crew Time and Conserving Resources: Superhydrophillic Treatment of Hardware in Crew Hygiene Areas Project Image
(https://techport.nasa.gov/image/132444)

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.1 Environmental Control & Life Support Systems (ECLSS) and Habitation Systems
    - TX06.1.4 Habitation Systems

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System